416. Proposed by C. E. FLANAGAN, Wheeling, Va.

The sides of a given rectangle are a and b, in which a rectangle is to be inscribed one of whose sides is c. Find the other side, using Euler's rule for quartics.

417. Proposed by A. J. RICHARDSON, Marquette, Mich.

Required to reduce the quartic

$$x^4 + px^2 + qx + r = 0$$

to the form

$$(x^2 + k)^2 = [(2k - p)x + (2k - q)]^2,$$

wherein k is the solution of a certain cubic. Hence, express the solution of the given quartic in terms of p, q, r, and k.

GEOMETRY.

When this issue was made up, solutions had been received for 434–5–6 and 439. Solutions of 432–3 and 441–2–3 are desired.

441. Proposed by H. E. TREFETHEN, Colby College.

In the triangle ABC find the locus of all points at which the sides AB, AC subtend equal angles.

442. Proposed by J. B. SMITH, Hampden-Sidney, Va.

If any three straight lines, AD, BE, CF, be drawn from the corners of the triangle ABC to the opposite sides, a, b, c, they will enclose an area. If Δ, Δ'' be the areas of the triangles ABC, DEF show that

$$\frac{\Delta''}{\Delta} = \frac{(AF \cdot BD \cdot CE - AE \cdot CD \cdot BF)^2}{(ab - CE \cdot CD)(bc - AE \cdot AF)(ca - BF \cdot BD)},$$

where the signs of the factors are to be determined by the following rule: Each segment being measured from one of the corners of the triangle ABC, along one of the sides, is to be regarded as positive or negative according as it is drawn towards or from the other corner in that side.

443. Proposed by C. N. SCHMALL, New York City.

A quadrilateral of any shape whatever is divided by a transversal into two quadrilaterals. The diagonals of the original figure and those of the two resulting (smaller) figures are then drawn. Show that their three points of intersection are collinear.

CALCULUS.

When this issue was made up, solutions had been received for 346–7–9 and 351–4–6–7. Solutions of 332–5, 340–5–8 and 352–3–5 are desired. A complete solution of 339 is also desired.

363. Proposed by B. F. FINKEL, Drury College.

The axis of a right prism whose cross-section is a regular polygon of n sides coincides with the diameter of a sphere of radius R. Find the surface of the sphere included within the prism.

364. Proposed by EMMA GIBSON, Drury College.

Solve the differential equation

$$(xp - y)^2 = a(1 + p^2)(x^2 + y^2)^{3/2}, \qquad \text{where } p = dy/dx.$$

365. Proposed by C. N. SCHMALL, New York City.

Show that the area inclosed by each of the following three curves is equal to that of the circle of radius a; viz., πa^2.

(1) $$a^2x^2 = y^3(2a - y),$$

(2) $$a^2 - x^2 = (y - mx^2)^2,$$

(3) $$(xy + c + bx^2)^2 = x^2(a^2 - x^2).$$